

## ABSTRACT

The thesis is presented in 58 pages. It contains appendixes and bibliography of 8 references. Twenty seven figures and 1 table are given in the thesis.

The goal of the thesis is to develop mathematical and software tools for building the discrete vessel surface by MRI images to identify the sick vessel parts.

In the thesis, existing solutions are analyzed, such as manual recognition of MRI images, automated recognition of MRI images and particle representing of vessel. They are compared in terms of dependings and the size of input datasets. In the thesis, and particle representing of vessel approach is used to solve the task.

The simplified mathematical vessel wall model is developed by approach chosen. This model is look like polygon with spring borders. For the mathematical model developed there are described methods to determine forces acting on polygon vertices and stiffness for every separate spring of polygon. An automated system that implements the method chosen has been developed. Tests of the system developed were completed.

Keywords: vessel, vessel wall model, polygon with sides in the form of springs, the envelope of the cross-section of the vessel, the stiffness of cross sectional areas of the vessel.